Mikelayi, Wumaier:

THE IMPORTANCE OF CLIMATE CHANGE EDUCATION FOR UNIVERSITY STUDENTS[9]

The Intergovernmental Panel on Climate Change (IPCC 2021) articulates that "Climate change refers to a change in the state of the climate that can be identified by changes in the mean and/or the variability of its properties (e.g. temperature, precipitation, humidity, incident radiation, wind patterns), and that persists for an extended period, typically decades or longer. Climate change can be caused by a number of natural mechanisms such as; volcanic eruption, ocean current, the earth's orbital changes and solar variations" (Udegbunam, 2020).

The phenomenon of climate change

According to Sulistyawati et al. (2018), climate Change will continue to increase in its intensity, and there is a great risk to public health, global food security, economic development, and to the natural world on which much of humans' prosperity depends. Rahman et al. (2021), stated that dimensions of natural disasters due to climate change such as flood, wildfires, excessive sunlight, heavy rains, heatwaves, clean water crises, earthquake, excessive wind, rising sea levels, drought, thunderstorms, melting of ice caps, tsunamis and so on are fast occurring and are placing citizens of various countries in serious danger.

Mitigation and adaptation are the primary responses of the human community to Climate Change in order to reduce its incidence and minimize its negative impacts on humans and the ecosystems. According to Schwirplies (2018), climate change mitigation encircles all the measures that help in reducing greenhouse gas emissions like the use of energy-efficient equipment, devices, and vehicles; and the use of alternative fuels, e.g., solar energy, biofuel or biodiesel and wind energy, tree planting, Afforestation, Reforestation and Agroforestry. Wadson et al., (2023) stated that adaptation dimension relates to building resilience and reducing vulnerability in the face of Climate Change impacts that are already happening or are soon to happen.

Education serves as one of the social pillars that raise the younger generation's climate change knowledge and contributes to bridging gaps in scientific and social comprehension of climate change (García et al., 2022).

Overview of students' knowledge and attitude to climate change

According to Modu et al (2024), students have the potential to drive climate change mitigation and adaptation, but their ability to implement solutions depends on enhancing their knowledge and attitude towards climate change. Knowledge has been defined as the state of being aware of and understanding reality. Climate change knowledge therefore is a person's awareness and understanding of the fact and realities of climate change. knowledge of climate change could help students become scientifically and ecologically literate citizens, who can describe, explain and predict natural phenomena using sound ecological thinking, capable of full participation in a democratic sustainable society. The level of knowledge on the impact of climate change could lead students to engage in activities that contribute to climate change solutions. Oruonye (2011) stated that Adequate knowledge of the effects of climate change will help make students to join forces in reducing the vulnerability of societies to climate related risks both now and in the future. Rahman et. al (2019) explained that knowledge of Climate Change may help learners develop a sense of responsibility in managing the environment.

[9] https://doi.org/10.17048/Tanulasestarsadalom.2025.9

A person's attitude expresses one's thoughts and feelings about a specific object (Deshiana et. al, 2022). Attitude means the way an individual think or acts towards a given subject or issue. Attitude can guide experiences and decide the effects of experience on our behaviors. Students' attitudes to climate change guides how and the manner they respond to challenges as a result of climate change. Yadav et. al (2023) describes attitude as persons' enduring favorable or unfavorable cognitive evaluations, feelings, and action tendencies toward some object or idea. It is actually an acquired feeling. Attitude is the mixture of beliefs and feelings that people have about situations, specific ideas or other people.

Climate change knowledge and positive attitude are key for successful adaptation and mitigation. Karpudewan et al. (2015) stated School-based education specifically plays an important role in improving students' attitude and knowledge and it was indicated that potential effectiveness of education is higher when students possess knowledge and positive attitude towards a specific issues particularly issues concerning global warming.

Strategies for developing students' knowledge and attitudes about climate change

In the quest of searching for appropriate strategies to improve climate change knowledge and attitude among students, Odoom (2020) identifies three pedagogical processes for learning climate change which are; local observation of phenomenon, conceptual change theory and experiential learning. The local observation of phenomenon concerns with creating appropriate platforms for the learners to observe a phenomenon in order to construct or shape their ideas. The conceptual change theory involves conceptual development where initial ideas held by students are shaped into more scientific notion. During this process, the initial idea or conceptions are enriched and restructured and therefore strengthened or replaced. Experiential learning involves learning by interacting with the environment. It is defined as the process by which the learner constructs knowledge through affective and cognitive interactions with the biophysical and the built environment. Monroe et. al. (2019) suggested some strategies to improve teaching and learning of climate change knowledge and attitude to include transdisciplinary, project-based learning and critical thinking. Transdisciplinary approaches include means to embed multiple inputs, development requirements, and expectations from a variety of actors, many of whom are located outside of learning centers, in the curriculum. It involves integrating multiple discipline and perspective to address complex issues surrounding climate change education. Critical-thinking strategy would enable students to understand what is going on in society, ask critical questions, and be determined and spur on action. Project-based learning is a form of learning that is oriented on learning in the real world and allows learners to actively participate in gaining topic knowledge and expertise.

It is also encouraged by Field et al. (2019) and Beach et al. (2019) that graphical representations and videos, stories, field trips, observation, project, and enquiry-based teaching coupled with discussion and creating a platform for learners to engage in democratic process of thinking, agreeing, implementing, and evaluating concrete changes individually and in a group through debates be used in teaching and learning of climate change.

Summary

Expanding knowledge about climate change, developing environmental attitudes and developing environmentally conscious behavior are defining challenges for 21st century education. The task of climate change education is to help students process information flowing through the internet and media, understand the Earth's ecological system, and practice environmentally conscious actions, thereby increasing the effectiveness of sustainability education (Jáger & Rausch, 2021).

Climate change education is possible through authentic example-setting, so teachers teaching students have an essential role. It is necessary that teachers themselves have confident knowledge of the topic, while being motivated towards environmentally conscious actions. The development of teacher training and in-

service teacher training processes, focusing on the topic of climate change and sustainable development, can help to achieve this. A defining part of climate change education is also locality, strengthening examples implemented in the local environment, and placing them on a global level. The importance of teachers in supporting this is also extraordinary, since a given school or local community is able to set an example that achieves real effects in the field of sustainability by involving children. All this requires an interdisciplinary approach that takes into account the role of social sciences in accordance with natural science knowledge. Bringing together teachers who specialize in individual subjects and promoting a multidisciplinary approach supports effective learning about the phenomenon – for both teachers and students. (Jáger & Rausch, 2021).

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